

**AMENDMENT TO THE CLAIMS:**

Please amend claims 6-10 and 13-18, as follows.

Claims 1-5 (Cancelled)

6. (Currently Amended) A method for producing a semiconductor device having a cylindrical storage node comprising a bottom portion and a cylindrical portion which surrounds an outer circumference of said bottom portion and extends upward, which comprises the steps of:

forming a contact hole which penetrates an interlayer insulating film formed on a semiconductor substrate;

forming an electric conductive film on said interlayer insulating film whereby said contact hole is filled to obtain a contact to said substrate;

forming an insulating film on said electric conductive film;

patterning by an anisotropic etching said insulating film and said electric conductive film to form a configuration corresponding to said cylindrical portion so that the core and the bottom portion of said cylindrical portion are formed;

forming the cylindrical portion on the side of said core and said bottom portion wherein an outer wall of said cylindrical portion is roughened, comprising the sequential steps of forming a film containing silicon on said core and said bottom portion; roughening an outer surface of said film containing silicon by forming silicon grains in the outer surface of it; and conducting an anisotropic etching for patterning to form a side-wall-like said cylindrical portion having a side-wall like shape at the side of said core and said bottom portion;

removing said core;

forming a dielectric film to cover said cylindrical storage node comprising said cylindrical portion and said bottom portion; and

forming a cell plate on said dielectric film, whereby a capacitor constituted by said cylindrical storage node, said dielectric film and said cell plate is formed.

7. (Currently Amended) A method for producing a semiconductor device having a cylindrical storage node comprising a bottom portion and a cylindrical portion which surrounds an outer circumference of said bottom portion and extends upward, which comprises steps of:

forming a contact hole which penetrates an interlayer insulating film formed on a semiconductor substrate;

forming an electric conductive film on said interlayer insulating film whereby said contact hole is filled to obtain a contact to said substrate;

forming an insulating film on said electric conductive film;

patterning by an anisotropic etching said insulating film and said electric conductive film to form a configuration corresponding to said cylindrical portion so that the core and the bottom portion of said cylindrical portion are formed;

forming the cylindrical portion on the side of said core and said bottom portion wherein an outer wall of said cylindrical portion is roughened, comprising forming an amorphous silicon film on said core and said bottom portion; conducting an anisotropic etching of said amorphous silicon film to form ~~a side-wall like~~ said cylindrical portion having a side-wall like shape at the side of said core and said bottom portion; and roughening ~~an~~ said outer wall ~~surface~~ of said cylindrical portion ~~amorphous silicon~~ by forming silicon grains ~~in the outer surface of it to~~ thereby form said cylindrical portion;

removing said core;

forming a dielectric film to cover said cylindrical storage node comprising said cylindrical portion and said bottom portion; and

forming a cell plate on said dielectric film, whereby a capacitor constituted by said cylindrical storage node, said dielectric film and said cell plate is formed,

wherein the inner wall of the cylindrical portion having ~~a~~the roughened outer wall is constituted by amorphous silicon.

8. (Currently Amended) A method for producing a semiconductor device according to Claim 6, wherein the roughening of the outer surface of the film containing silicon is selected from the group consisting of a heat treatment with use of silane and a heat treatment in vacuum after a treatment to the outer surface of said film containing silicon with use of hydrofluoric acid, whereby projections and recesses are formed in the outer surface wall of said ~~amorphous film~~ containing silicon by forming silicon grains in the outer surface wall.

9. (Currently Amended) A method for producing a semiconductor device according to claim 7, wherein the roughening of the outer wall surface of the cylindrical portion ~~amorphous silicon~~ is selected from the group consisting of a heat treatment with use of silane and a heat treatment in vacuum after a treatment to the outer wall surface of said cylindrical portion ~~amorphous silicon~~ with use of hydrofluoric acid, whereby projections and recesses are formed in the outer wall of said cylindrical portion ~~amorphous silicon~~ by forming silicon grains in the outer wall.

10. (Currently Amended) A method for producing a semiconductor device according to Claim 8, wherein the inner wall of the cylindrical portion having a ~~a~~the roughened outer wall is constituted by said film containing silicon, said film containing silicon including amorphous silicon.

Claim 11 (Cancelled)

12. (Previously Amended) A method for producing a semiconductor device having a cylindrical storage node comprising a bottom portion and a cylindrical portion which surrounds an outer circumference of said bottom portion and extends upward, which comprises steps of:

forming a contact hole which penetrates an interlayer insulating film formed on a semiconductor substrate;

forming an electric conductive film on said interlayer insulating film whereby said contact hole is filled to obtain a contact to said substrate;

forming an insulating film on said electric conductive film;

patterning by an anisotropic etching said insulating film and said electric conductive film to form a configuration corresponding to said cylindrical portion so that the core and the bottom portion of said cylindrical portion are formed;

forming the cylindrical portion on the side of said core and said bottom portion wherein an outer wall of said cylindrical portion is roughened;

forming a dielectric film on said cylindrical storage node comprising said cylindrical portion and said bottom portion within which said core remains; and

forming a cell plate on said dielectric film, whereby a capacitor constituted by said cylindrical storage node, said dielectric film and said cell plate is formed.

13. (Currently Amended) A method for producing a semiconductor device according to Claim 12, wherein the step of forming the cylindrical portion on the side of the core and the bottom portion wherein the outer wall of the cylindrical portion is roughened, comprises forming an amorphous silicon film on said core and said bottom portion; roughening an outer surface of said amorphous silicon film by forming silicon grains in the outer surface of it; and conducting an anisotropic etching for patterning to form ~~a side-wall like~~ said cylindrical portion having a side-wall like shape at the side of said core and said bottom portion.

14. (Currently Amended) A method for producing a semiconductor device according to Claim 12, wherein the step of forming the cylindrical portion on the core and the bottom portion wherein the outer wall of the cylindrical portion is roughened, comprises forming an amorphous silicon film on said core and said bottom portion; conducting an anisotropic etching of said amorphous silicon film to form ~~a side-wall like~~ said cylindrical portion having a side-wall like shape at the side of said core and said bottom portion; and roughening ~~an~~ said outer wall surface of said cylindrical portion ~~amorphous silicon~~ by forming silicon grains ~~in the outer surface of it to thereby form said cylindrical portion~~.

15. (Currently Amended) A method for producing a semiconductor device according to claim 13, wherein the roughening of the outer surface of the amorphous silicon film is selected from the group consisting of a heat treatment with use of silane and a heat treatment in vacuum

after a treatment to the outer surface of said amorphous silicon film with use of hydrofluoric acid, whereby projections and recesses are formed in the outer surface ~~wall~~ of said amorphous silicon film by forming silicon grains in the outer surface ~~wall~~.

16. (Currently Amended) A method for producing a semiconductor device according to claim 14, wherein the roughening of the outer wall ~~surface~~ of said cylindrical portion ~~amorphous silicon~~ is selected from the group consisting of a heat treatment with use of silane and a heat treatment in vacuum after a treatment to the outer wall ~~surface~~ of said cylindrical portion ~~amorphous silicon~~ with use of hydrofluoric acid, whereby projections and recesses are formed in the outer wall of said cylindrical portion ~~amorphous silicon~~ by forming silicon grains in the outer wall.

17. (Currently Amended) A method for producing a semiconductor device according to claim 15, wherein the inner wall of the cylindrical portion having a the roughened outer wall is constituted by amorphous silicon.

18. (Currently Amended) A method for producing a semiconductor device according to claim 16, wherein the inner wall of the cylindrical portion having a the roughened outer wall is constituted by amorphous silicon.